

*The National Academies of*  
SCIENCES • ENGINEERING • MEDICINE

# GUIRR Webinar: The NASEM Assessment of ARPA-E

Lou Schick, Committee Member  
John C. Wall, Committee member  
Paul Beaton, NASEM Study Director

**24 October 2017**

# Webinar Agenda

- Why NASEM conducted the assessment
- What the committee did
- What the committee found
- What the committee recommended
- Questions from listeners

An Assessment of ARPA-E  
Policy And Global Affairs Division

## But first, the punch line:

- Finding 4-3: While 6 years is not long enough to produce observable evidence of widespread deployment of funded technologies, **there are clear indications that ARPA-E is making progress toward its statutory mission and goals.**

An Assessment of ARPA-E  
Policy And Global Affairs Division

# The Punch Line:

- “Importantly, especially at this early stage, the committee found no signs that ARPA-E is failing, or on a path to failing, to deliver on its mission and goals.”

An Assessment of ARPA-E  
Policy And Global Affairs Division

# Briefings to Date

- Briefing for ARPA-E
- Briefings for Members of Congress and staff
- Public Launch of Report
- Briefings for other groups and institutions

An Assessment of ARPA-E  
Policy And Global Affairs Division

# Why Assess ARPA-E?

- Congressional request
  - Mandated in ARPA-E's authorizing statute
- Provide guidance to the agency
- Provide guidance to other organizations seeking to support or undertake innovative R&D

An Assessment of ARPA-E  
Policy And Global Affairs Division

# What was done?

- Review of literature
- Analyze administrative records
- Bibliometric Analysis
- Analysis of Patenting Activity
- Attempt to analyze private follow-on funding

An Assessment of ARPA-E  
Policy And Global Affairs Division

# What was done?

- Attempt to analyze formation of new firms and spinoffs
- Consultations with individuals
- Review of selected programs & projects
  - All concluded energy storage programs
- Case studies

An Assessment of ARPA-E  
Policy And Global Affairs Division



# Findings & Recommendations

- Big Picture (Paul)
- Operations (Paul)
- Technical (John)
- Technical (Lou)

An Assessment of ARPA-E  
Policy And Global Affairs Division

# Big Picture Findings

- Finding 3-2: Program director discretion enables ARPA-E to fund relatively risky projects, with no indication that average project performance in the short term is reduced.

An Assessment of ARPA-E  
Policy And Global Affairs Division

# Big Picture Findings

- Finding 4-2: The projects ARPA-E has funded support its statutory mission and goals.

An Assessment of ARPA-E  
Policy And Global Affairs Division

# Big Picture Recommendations

- Recommendation 3-1: ARPA-E should preserve its distinctive and flexible management approach that empowers program directors and stresses active project management.

An Assessment of ARPA-E  
Policy And Global Affairs Division

# Big Picture Recommendations

- Recommendation 4-2: The director of ARPA-E should continue to promote and maintain a high-risk culture within the agency...

An Assessment of ARPA-E  
Policy And Global Affairs Division

# Findings & Recommendations

## Operational Assessment

Paul Beaton

An Assessment of ARPA-E  
Policy And Global Affairs Division

# Operations Findings

- Finding 3-1: ARPA-E program directors have been empowered to take risks in project selection in line with the agency's mission.

An Assessment of ARPA-E  
Policy And Global Affairs Division

# Operations Findings

- Finding 3-3: Program directors are continuously engaged in ongoing projects...

An Assessment of ARPA-E  
Policy And Global Affairs Division



# Operations Findings

- Finding 3-8: ARPA-E program directors have wide authority to develop new focused technology programs that are potentially transformative.

An Assessment of ARPA-E  
Policy And Global Affairs Division

# Operations Recommendations

- Recommendation 3-5: The secretary of energy should ensure that other offices and programs within DOE continue to explore and adopt elements of ARPA-E's practices that can improve the department's operations.

An Assessment of ARPA-E  
Policy And Global Affairs Division

# Operations Recommendations

- Recommendation 4-3: ARPA-E should continue to use processes designed to identify and support unexplored opportunities that hold promise for resulting in transformational technological advances.

An Assessment of ARPA-E  
Policy And Global Affairs Division

# Findings & Recommendations

## Technical Assessment

John C. Wall (NAE)

An Assessment of ARPA-E  
Policy And Global Affairs Division

# Technical Findings

- Finding 4-4: One of ARPA-E’s strengths is its focus on funding high-risk, potentially transformative technologies and overlooked, “off-roadmap” opportunities pursued by neither private firms nor other funding agencies, including other programs and offices within DOE.

An Assessment of ARPA-E  
Policy And Global Affairs Division

# Technical Findings

- Finding 3-4: ARPA-E considers its “technology-to-market” (T2M) activities to be an ongoing experiment, and the challenge of developing such a program may be greater than originally thought.

An Assessment of ARPA-E  
Policy And Global Affairs Division

# Technical Recommendations

- Recommendation 3-3: ARPA-E should reconceptualize its “technology-to-market” program to account for the wide variation in support needed across programs and performers ...

An Assessment of ARPA-E  
Policy And Global Affairs Division

# Technical Findings

- Finding 4-7: Through its projects and programs, ARPA-E is accumulating not only technical knowledge of what is working and has promise, but also potentially very useful information on what does not work that can be an important addition to ARPA-E documentation.

An Assessment of ARPA-E  
Policy And Global Affairs Division



# Technical Recommendations

- Recommendation 4-6: ARPA-E program directors should compile a document or other repository of lessons learned on all projects, including both positive and negative outcomes.

An Assessment of ARPA-E  
Policy And Global Affairs Division

# Technical Findings

- **Finding 4-9: ARPA-E is not yet able to assess the full extent to which it has achieved its statutory mission and goals. However, it is in a good position to develop a framework for prospectively mapping data on project selection and management to mission success and goal achievement.**

An Assessment of ARPA-E  
Policy And Global Affairs Division

# Technical Recommendations

- Recommendation 4-8: The ARPA-E director and program directors should **develop and implement a framework for measuring and assessing the agency's impact in achieving its mission and goals.**

An Assessment of ARPA-E  
Policy And Global Affairs Division

# Findings & Recommendations

## Technical Assessment

Lou Schick

An Assessment of ARPA-E  
Policy And Global Affairs Division

# Technical Findings

- Finding 4-5: Some of the language used by ARPA-E creates an impractical expectation and mission that are not necessarily in the agency's original authorizing statute.

An Assessment of ARPA-E  
Policy And Global Affairs Division

# Technical Findings

- Finding 4-8: ARPA-E is in many cases successfully enhancing the economic and energy security of the United States by funding transformational activities... However, ARPA-E is doing a poor job of creating awareness of these very real successes...

An Assessment of ARPA-E  
Policy And Global Affairs Division

# Technical Recommendations

- Recommendation 3-4: ARPA-E should continue its practice of hiring program directors for 3-year terms, allowing for one, term-limited extension when necessary ...

An Assessment of ARPA-E  
Policy And Global Affairs Division

# Technical Recommendations

- Recommendation 4-4: ARPA-E should be careful not to misinterpret or extend its interpretation of its original authorizing statute...

An Assessment of ARPA-E  
Policy And Global Affairs Division



# Technical Recommendations

- Recommendation 4-7: ARPA-E should increase and improve its communication for non-technical audiences...

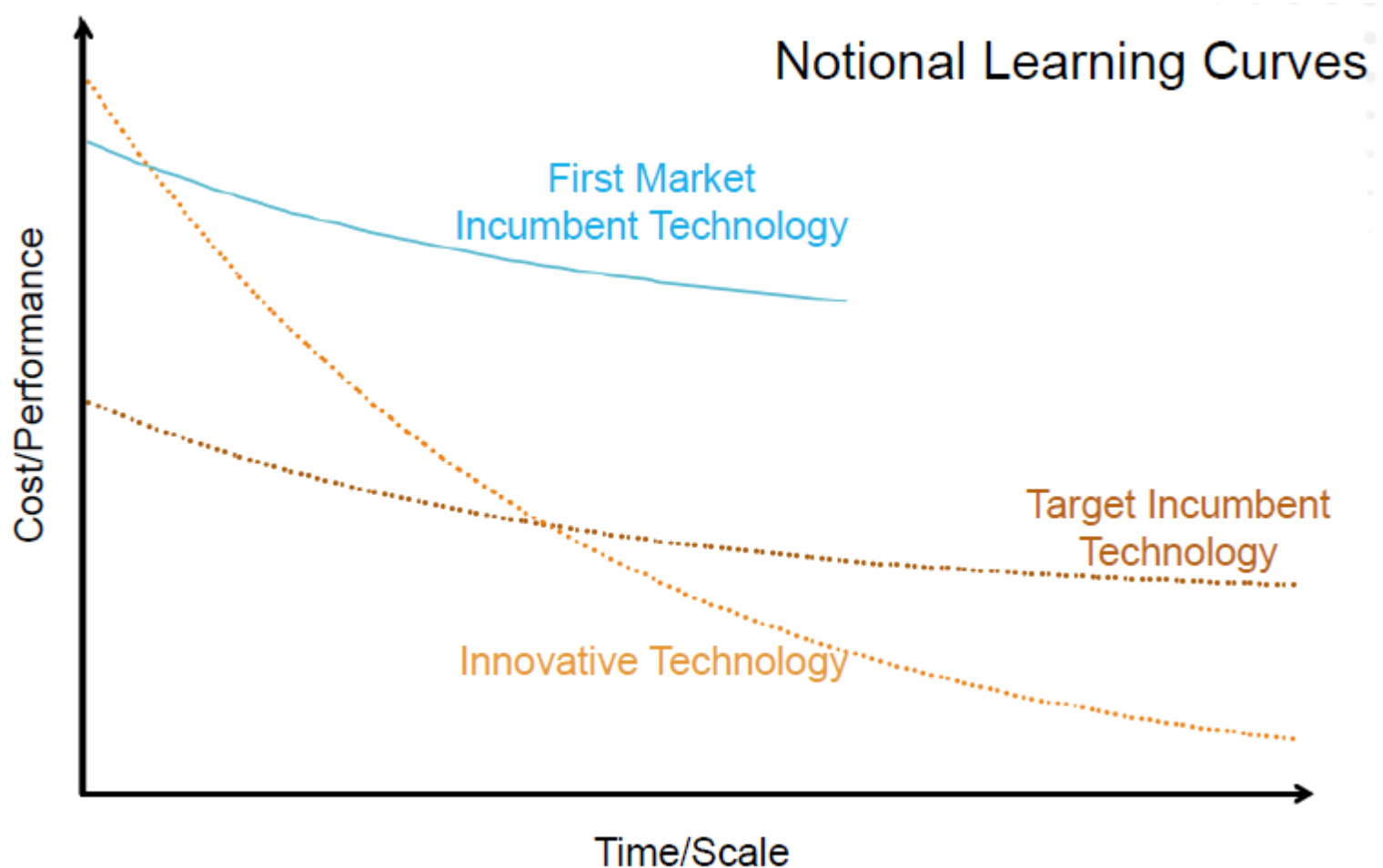
An Assessment of ARPA-E  
Policy And Global Affairs Division

# Quick “Wins” & Big Shifts

- Quick Wins
  - Technology quickly to market
  - Easy to see how technology can make a difference
- Big Shift
  - Change what is possible
  - Potentially large payoff, but not visible for many years
  - Change direction of R&D for entire industry

An Assessment of ARPA-E  
Policy And Global Affairs Division

# Quick “Wins” & Big Shifts



An Assessment of ARPA-E  
Policy And Global Affairs Division

# Thank You

- Questions
- Committee & staff available for follow on discussions after the webinar

An Assessment of ARPA-E  
Policy And Global Affairs Division